CDCB®
COUNCIL ON DAIRY CATTLE BREEDING

# Reintroducing Reproductive Performance Traits

An overview of research findings, trait update summaries and individual trait information

*August 2026 Updates*

# Reintroducing Reproductive Performance Traits

*August 2026 Updates*

Since 2003, the U.S. national evaluation system has produced traits that predict female reproductive performance. In 2024, a foundational review of this trait portfolio began. This document outlines the research and its results: revisions to the four established traits and a new trait producers can add to their reproductive toolbox. All five traits are available for Ayrshire, Brown Swiss, Guernsey, Holstein, Jersey, and Milking Shorthorn males and females as of August 2026.

PTA is expressed as the difference from the breed average for animals born in the base year. The unit of measurement varies. DPR, CCR, and HCR are expressed as percentages while FSC and EFC are expressed in days.

## Daughter Pregnancy Rate (DPR)

*Predicts percentage of non-pregnant cows that will become pregnant in each 21-day cycle compared to the breed base*

DPR is calculated as a function of days open and voluntary waiting period (VWP). Days open is calculated as the number of days from calving to conception. Days open is transformed into a pregnancy rate using the VWP and scaled to represent the probability that a non-pregnant cow becomes pregnant during each 21-day estrous cycle. This trait utilizes a VWP that is now calculated on a herd-year and lactation group (first lactation only and later lactations) basis. DPR PTA predicts the expected difference in pregnancy rate of an animal's daughters, expressed in percentage points, relative to the breed base.

## First Service to Conception (FSC) - NEW!

*Predicts a lactating cow's ability to conceive, expressed in days*

FSC is a new trait that coincides with revisions to current reproductive performance traits. FSC PTA predicts the expected difference, in days, from first service to conception in an animal's daughters relative to the breed base. A positive PTA represents fewer days to conception. FSC is not a function of a VWP, which allows it to account for individual cow management independently of VWP changes.

## Cow Conception Rate (CCR)

*Predicts a lactating cow's ability to conceive*

CCR is defined as the proportion of inseminations that result in pregnancy for an individual cow, based on outcomes from up to the first seven inseminations. First implemented in 2009, CCR PTA predicts the expected difference in conception rate of daughters as cows relative to the breed base. The CCR model now also includes a covariable for days-in-milk at the first insemination.

## Heifer Conception Rate (HCR)

*Predicts a maiden heifer's ability to conceive*

HCR is defined as the proportion of inseminations that result in pregnancy for an individual heifer, based on outcomes from up to the first seven inseminations. First implemented in 2009, HCR PTA predicts the expected difference in conception rate of maiden heifer daughters relative to the breed base.

## Early First Calving (EFC)

*Predicts ability to alter female offspring's age at first calving*

Introduced in 2019, EFC is calculated as the number of days between a heifer's birth and her first calving. EFC PTA predicts the expected difference, in days, in age at first calving of an animal's female offspring relative to the breed base.

| Trait | Expressed In | PTA Range of Active A.I. Bulls[1] | Application of Trait |
|---|---|---|---|
| **Daughter Pregnancy Rate (DPR)** | Percent (%) | Holstein: -5.3 to +5.7<br>Jersey: -3.6 to +5.0<br>Brown Swiss: -1.6 to +3.0 | Informational for producers who use a voluntary waiting period on a herd level and want cows to cycle, get bred, and become pregnant quickly, regardless of the number of services. |
| **Cow Conception Rate (CCR)** | Percent (%) | Holstein: -8.3 to +7.3<br>Jersey: -4.1 to +5.1<br>Brown Swiss: -3.6 to +2.9 | Best for a producer who wants to improve conception rate success per service, since this trait reflects how many inseminations are needed. |
| **First Service to Conception (FSC)** | Days | Holstein: -24.8 to +20.7<br>Jersey: -12.5 to +15.2<br>Brown Swiss: -7.8 to +9.2 | Useful for producers who select voluntary waiting periods on a cow basis and want cows to get pregnant as quickly as possible after the first breeding without focusing on how many services it takes. |

1 - Values produced in a test run scenario. Some variation is expected in August 2026 as more phenotypic records are added and the list of Active A.I. bulls is updated.

## Research Overview

Reproductive performance was first available for direct selection for dairy cattle in 2003 with the introduction of DPR. Six years later, CCR and HCR were added to the portfolio, and in 2019, EFC was introduced. Over these 20 years, reproductive management has changed substantially – synchronization programs, sexed semen, beef semen in dairy herds, and variation in VWPs all impact a cow's reproductive performance.

### Observations Triggering the Review

1. Seasonal fluctuation between official triannual evaluations
2. Large changes between December and April evaluations
3. Young bull PTAs declining in subsequent evaluations (PTAs are expected to move both upward and downward as daughter information is added)
4. Genetic trends moved in unexpected directions for traits heavily selected for on-farm

### Objectives of the Review

1. Identify causes of consistent fluctuations in reproductive performance evaluations
2. Enhance evaluation stability
3. Reflect modern reproductive management
4. Evaluate potential new traits

### Research Timeline

**2024**

**February – July:** Data investigation and thorough documentation of legacy system

**August – December:** Initial testing of proposed solutions including a new trait, First Service to Conception (FSC)

**2025**

**January – July:** Continued research and testing to refine approaches identified in initial testing

**August – December:** Testing all updates across seven consecutive triannual evaluations

**2026**

**January – February:** Interbull validation passed for 10 updates to existing traits and introduction of FSC

**August:** Implementation of trait revisions and new FSC trait.

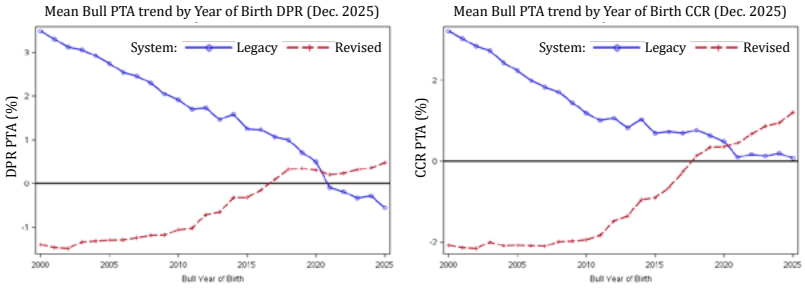
### Research Team

T.M. McWhorter, J.R. Graham, E. Nicolazzi, P.M. VanRaden, A. Ling, S. Savoia, and A. Legarra

## Key Findings

### #1: Genetic trends reflect on-farm observations

The genetic trends for these traits now align with producer-observed reproductive performance and selection pressure. These graphs depict genetic trends (DPR left; CCR right) using mean traditional PTA of bulls from all evaluated breeds in the legacy system (blue) and the revised system (red).




### #2: Young bull PTAs behave more regularly

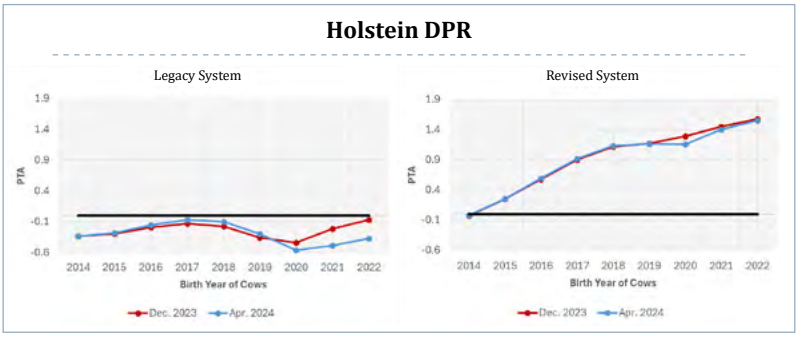
As daughters are added to evaluations, it is expected that approximately equal numbers of bulls will have decreasing and increasing PTA values between triannual evaluations. In the legacy system, more than 55% of bulls showed constant declining PTA at each run from December 2023 to December 2024. The revisions help equalize these fluctuations and reduce the persistent negative trend observed for a majority of bulls.

### #3: Proven bulls remain stable

While young bulls are expected to change with new daughter information, older proven bulls with large daughter numbers who are now inactive should remain stable over time. This continues to occur in the revised system.

### #4: Average trends over time show less variation

Average sire PTA of cows by birth year reflects the genetic merit of the bulls used to produce cows with reproductive performance phenotypes. When comparing Holstein DPR in the December 2023 and April 2024 evaluations, the revised system shows a clearer upward trend and smaller average differences between evaluations, indicating more consistent genetic progress.




### #5: Interbull validates evaluations

Interbull is an international organization that offers third-party review and validation of genetic evaluations calculated by national evaluation centers like CDCB. The revised reproductive performance traits and the new FSC trait passed this validation confidently.

# Summary of Updates to Reproductive Performance Traits

Throughout the two-year review of the performance of these evaluations, numerous solutions were tested to refine the reproductive performance traits. The 10 implemented updates, including the introduction of a fifth trait, are outlined below. These revisions were tested over seven consecutive triannual evaluation runs for stability in predictions. Prior to launch, this comprehensive trait package also passed the international validation process, conducted by Interbull, and was reviewed by CDCB's Genetic Evaluations Methods Group and the Dairy Evaluation Review Team.

**Scan to watch – *Modern Herds, Modern Hurdles: Aligning Female Fertility Evaluations.***

### Update 1: Utilize herd-year and lactation group-specific VWPs in DPR calculation

DPR calculation now includes a variable that accounts for VWP by specific herd-year and lactation group. The previous formula assumed a fixed 50-day VWP with a 20-day grace period. This update accounts for herd-level changes in VWP and differences between lactation groups.

### Update 2: Implement First Service to Conception (FSC)

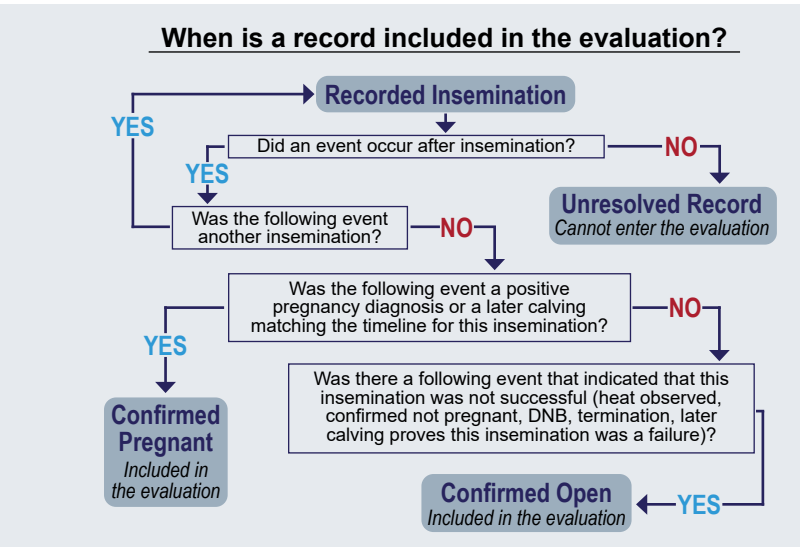
First Service to Conception (FSC) is an interval trait measured in days and is not affected by VWP. It is the number of days from the first insemination to conception.

### Update 3: Account for service sire breed, mating type, and short cycling in CCR and HCR

CCR and HCR now account for service sire breed in addition to mating type and short cycling. Mating type includes gender selected semen, conventional semen, natural, or unknown. Short cycling refers to an insemination that takes place 10 to 17 days after the previous insemination.

### Update 4: Reduce data-driven bias in young bulls' PTAs

Daughter data is not included until 36 months after the birth of the cow for DPR, CCR, and FSC. This edit provides additional time for both high and moderate-to-low reproductive performance daughters to enter the evaluation closer together, producing a fairer and more stable genetic estimate. This modification results in bulls requiring one or two additional triannual evaluations before data from their first crop of daughters impacts these traits.




### Update 5: Apply stricter data edits to raw data

An edit to remove cows with a missing sire has been added to DPR and included in FSC. This data edit is already applied to CCR, HCR, EFC, and other traits.

More data availability for DPR eliminates the need for predictions on some of the missing data. Records with missing calving dates or missing days open were removed.

Stricter criteria is also applied for contemporary groups to be included in the phenotype file. If records belong to a contemporary group with less than four observations, the group and all observations within it are removed.

### Update 6: Improve programs extracting raw data from the National Cooperator Database

### Update 7: Include days-in-milk at first insemination covariable in CCR and FSC models

### Update 8: Calculate CCR, HCR, DPR, and FSC in a multi-trait model and EFC in a single-trait model

CCR, HCR, and DPR remain in a multi-trait model with the addition of the new trait, FSC. However, EFC, which was already treated as an uncorrelated trait, has been moved to a single-trait model for computational efficiency.

### Update 9: Employ stricter convergence criteria in the iterative solving procedure to ensure a more complete model convergence

### Update 10: Determine new variance component estimates

Both heritabilities and genetic correlations are obtained from variance component estimates. A genetic correlation shows how the genes affecting one trait are related to the genes affecting the other.

**Genetic Correlations**

| | Updated | Previous |
|---|---|---|
| DPR-CCR | +0.94 | +0.86 |
| DPR-HCR | +0.56 | +0.36 |
| CCR-HCR | +0.52 | +0.45 |
| CCR-FSC | +0.98 | - |
| DPR-FSC | +0.96 | - |
| HCR-FSC | +0.46 | - |

**Heritabilities**

| | Updated | Previous |
|---|---|---|
| DPR | 2.9% | 1.4% |
| CCR | 2.9% | 1.6% |
| FSC | 3.2% | - |
| HCR | 1.4% | 1.0% |
| EFC | 6.0% | 2.7% |

+1 = Traits are positively influenced by many of the same genes
-1 = Traits are inversely influenced by many of the same genes
0 = Traits are genetically independent

# Understanding the Differences In Traits

**BE ON THE LOOKOUT!**

The August 2026 revisions to reproductive performance traits do not affect the emphasis of traits in the lifetime merit indexes. This is because the weights on traits in these indexes are based on economic values, which are not being updated.

These revisions will have an impact on selection indexes – both those calculated by CDCB (NM$, CM$, FM$, GM$) and those calculated throughout the industry due to changes in PTA values. Productive Life will also see variation.

## Daughter Pregnancy Rate (DPR)

- Evaluates the ability of an animal's daughters to become pregnant after calving
- Derived from days open (calving to conception), which is transformed into a pregnancy rate and scaled to represent the probability that a non-pregnant cow becomes pregnant in each 21-day estrous cycle
- Incorporates voluntary waiting period (VWP) on a herd-year and lactation group level to account for management decisions affecting when cows are first bred
- Captures overall reproductive performance during lactation, including when cows are first bred, how many cycles are required to conceive, and how long cows remain open
- DPR reflects both biological fertility and management factors affecting breeding timing

## First Service to Conception (FSC)

- Evaluates how quickly a cow conceives after the first insemination and is expressed in days
- Reflects fertility once breeding has started rather than the full calving-to-pregnancy interval
- Removes the management component associated with VWP, focusing on conception following the first service
- Positive PTA indicates fewer days from first service to conception

## Cow Conception Rate (CCR)

- Probability that an individual lactating cow becomes pregnant at each insemination
- Calculated from insemination outcomes for up to the first seven services after calving
- Focuses on insemination success in lactating cows, reflecting fertility during lactation

## Heifer Conception Rate (HCR)

- Probability that a maiden heifer becomes pregnant at each insemination
- Calculated from insemination outcomes for up to the first seven services before first calving
- Focuses on insemination success in heifers, reflecting fertility before first calving

## Early First Calving (EFC)

- Age at first calving for daughters
- Positive PTA indicates fewer days to first calving relative to the breed base

# Reading Reproductive Performance Evaluations

The revisions to these four traits will have impacts on the PTA ranges seen in active bulls and the mean PTA of that population. Additional analysis of PTA ranges, reliabilities, and standard deviations for each trait are available on individual trait pages.

| | | PTAs of Active Bulls (HO) | | PTAs of Active Bulls (JE) | | PTAs of Active Bulls (BS) | |
|---|---|---|---|---|---|---|---|
| **Trait** | **Unit** | **Range** | **Mean** | **Range** | **Mean** | **Range** | **Mean** |
| **DPR** | **%** | -5.30 to +5.70 | +0.06 | -3.60 to +5.00 | +0.13 | -1.60 to +3.00 | +0.47 |
| **FSC** | **days** | -24.80 to +20.70 | +2.13 | -12.50 to +15.20 | +0.20 | -7.80 to +9.20 | +0.19 |
| **CCR** | **%** | -8.30 to +7.30 | +0.61 | -4.10 to +5.10 | +0.15 | -3.60 to +2.90 | +0.55 |
| **HCR** | **%** | -5.30 to +4.60 | +0.48 | -3.40 to +4.20 | -0.03 | -5.60 to +3.70 | -0.02 |
| **EFC** | **days** | -16.90 to +8.40 | +0.74 | -13.30 to +10.10 | +0.67 | -9.40 to +8.90 | +0.70 |

Interpreting PTAs is reliant on understanding the breed mean they are measured from. While DPR and FSC are highly genetically correlated, the expression of these traits is different. FSC is measured and expressed in days; DPR is measured and expressed as a percentage. A previous USDA study determined that a DPR +1.0% PTA equates to four fewer days open.

| | | Breed Mean (What PTA "0" Indicates) | | | | | |
|---|---|---|---|---|---|---|---|
| **Trait** | **Unit** | **AY** | **BS** | **GU** | **HO** | **JE** | **MS** |
| **DPR** | **%** | 25.29 | 24.55 | 23.44 | 32.19 | 34.98 | 28.62 |
| **FSC** | **days** | 63.44 | 71.94 | 79.50 | 55.60 | 52.04 | 47.66 |

*These values are calculated using data from the December 2025 run.*

## Resources and Research

Details on individual traits, published research supporting the traits, and more information about the 2026 reproductive revisions is available by scanning this QR code.

# First Service to Conception (FSC)

Introduced in August 2026, First Service to Conception PTA predicts a lactating cow's genetic ability to conceive after her first insemination, measured as the number of days from first service to conception, relative to the breed base. Genomic and genetic evaluations for FSC are provided for Ayrshire, Brown Swiss, Guernsey, Holstein, Jersey, and Milking Shorthorn (traditional only) males and females.

## Benefits of Trait

- Captures fertility performance independent of voluntary waiting period (VWP)
- Reflects individual cow response to modern reproductive management practices
- Improves evaluation of fertility in herds using extended or customized VWP
- Complements DPR and CCR by providing an interval-based measure of conception efficiency

## Heritability

FSC has a heritability of 3.2%. This level is typical for reproductive performance traits, indicating that genetic progress is gradual but cumulative over time.

## Description of Trait

FSC is the number of days from the cow's first breeding to conception within a lactation. If the cow conceives after 200 days, the FSC is set to 200 days. If the cow never conceives, the FSC is set to 230 days. The number of days is multiplied by -1, so positive PTA is desirable.

## Correlations with Other Traits

Within the reproductive performance trait portfolio, FSC is strongly correlated with Daughter Pregnancy Rate (+0.96) and Cow Conception Rate (+0.98) and moderately correlated with Heifer Conception Rate (+0.47). These correlations allow information from related reproductive performance traits to improve evaluation accuracy, particularly when data is limited.

## Data Source

The data used to calculate this trait is stored in the National Cooperator Database. FSC utilizes reproductive records for lactating cows, including first insemination dates, pregnancy confirmations, and subsequent calving information reported through U.S. dairy records programs.

Producers can help continue to improve reproductive performance traits by recording key information in on-farm software.

- Ensure animal ID is unique and recorded correctly
- Confirm each animal has sire, dam, and date of birth
- Properly record service sire with the NAAB code or bull ID for each reproductive event
- Record ET births

## How to Interpret the Trait

FSC is a useful trait for producers who want cows to get pregnant as quickly as possible after the first breeding, without focusing on how many services it takes.

PTAs are interpreted based on the breed average and expressed in days. Positive PTA values translate to fewer days from first service to conception. Meanwhile, negative values indicate more days from the breed average.

**HO Bull A**
FSC PTA: +5.0 (days)
*Expected daughter average: 50.60 days*

**JE Bull A**
FSC PTA: +5.0 (days)
*Expected daughter average: 47.04 days*

**HO Bull B**
FSC PTA: 0.0 (days)
*Expected daughter average: 55.60 days*

**JE Bull B**
FSC PTA: 0.0 (days)
*Expected daughter average: 52.04 days*

**HO Bull C**
FSC PTA: -5.0 (days)
*Expected daughter average: 60.60 days*

**JE Bull C**
FSC PTA: -5.0 (days)
*Expected daughter average: 57.04 days*

These averages are calculated during a test run and may vary slightly in August and beyond as additional phenotypic data becomes available.

- Ayrshire ..... 63.44 days
- Brown Swiss ..... 71.94 days
- Guernsey ..... 79.50 days
- Holstein ..... 55.60 days
- Jersey ..... 52.04 days
- Milking Shorthorn ..... 47.66 days

## Inclusion in Selection Indexes

As a newly introduced trait, FSC is not included in the lifetime merit indexes at this time. During the next revision, its inclusion will be evaluated.

## Resources and Research

Published research supporting this trait and the 2026 reproductive revisions is available by scanning this QR code.

Listen to The CDCB CowCast for a conversation with lead researcher Dr. Taylor McWhorter about the 2026 revisions to reproductive traits. Available on YouTube and podcast platforms on May 12.

## Range of Population

Most animals fall within a relatively narrow range around zero, with positive values indicating a higher-than-average genetic ability for successful conception per insemination and negative values indicating a lower-than-average ability relative to the breed base. These PTA values are calculated during a pre-release analysis. Some variation is expected in August 2026.

| | Active A.I. Bulls ("A" Status Bulls) | | | Genomic Bulls ("G" Status Bulls) | | | Bulls born since 2000 (≥ 90% reliability) | | |
|---|---|---|---|---|---|---|---|---|---|
| | PTA Range | Mean PTA | SD | PTA Range | Mean PTA | SD | PTA Range | Mean PTA | SD |
| Ayrshire | -7.3 to +15.4 | +2.38 | 6.60 | -4.4 to +9.6 | +1.15 | 2.79 | -11.2 to +17.9 | +0.99 | 6.01 |
| Brown Swiss | -7.8 to +9.2 | +0.19 | 3.90 | -10.4 to +10.1 | +0.13 | 4.56 | -20.1 to +12.1 | -1.63 | 5.59 |
| Guernsey | -9.5 to +10.9 | +2.75 | 6.13 | -11.0 to +17.5 | +2.69 | 6.96 | -15.5 to +15.3 | -2.57 | 6.81 |
| Holstein | -24.8 to +20.7 | +2.13 | 6.13 | -15.4 to +20.1 | +4.81 | 4.74 | -30.2 to +27.3 | -5.35 | 6.90 |
| Jersey | -12.5 to +15.2 | +0.20 | 5.68 | -17.2 to +15.3 | +1.57 | 5.18 | -31.3 to +25.1 | -3.39 | 6.15 |
| Milking Shorthorn | -14.7 to +4.7 | -3.28 | 8.38 | --- | --- | --- | -12.2 to +13.5 | -0.63 | 5.33 |

Approximately 68% and 95% of observations fall within one and two standard deviations (SD) of the mean, respectively. The following example demonstrates how these proportions apply to active Holstein and Jersey bulls.

| | PTA Standard Deviations ("A" Status Bulls) | | | |
|---|---|---|---|---|
| | -2 | -1 | +1 | +2 |
| Holstein | -10.14 | -4.00 | +8.26 | +14.40 |
| Jersey | -11.16 | -5.48 | +5.88 | +11.56 |

### Reliability Ranges

Reliability varies by animal and is influenced by the amount of available information. Young animals typically have lower reliability, while proven sires with extensive daughter records have higher reliability.

| | "A" Status Bulls |
|---|---|
| Ayrshire | 31% to 98.2% |
| Brown Swiss | 49% to 99% |
| Guernsey | 37.7% to 93% |
| Holstein | 30.6% to 99% |
| Jersey | 58.3% to 99% |
| Milking Shorthorn | 52.1% to 89.7% |

# Applying FSC on the Farm

### What makes FSC unique?

1. FSC is measured and expressed in days
2. FSC is independent of VWP
3. FSC includes a covariable for days-in-milk at first insemination

### How is the conception date determined for FSC?

FSC is the difference in days between the first insemination and the insemination that results in a confirmed pregnancy. A confirmed pregnancy is identified by a positive pregnancy result or a subsequent calving date.

### Differences in Cow Reproductive Performance Traits

| Trait | Expressed In | PTA Range of Active A.I. Bulls[1] | Application of Trait |
|---|---|---|---|
| **First Service to Conception (FSC)** | Days | Holstein: -24.8 to +20.7<br>Jersey: -12.5 to +15.2<br>Brown Swiss: -7.8 to +9.2 | Useful for producers who select voluntary waiting periods on a cow basis and want cows to get pregnant as quickly as possible after the first breeding without focusing on how many services it takes. |
| **Daughter Pregnancy Rate (DPR)** | Percent (%) | Holstein: -5.3 to +5.7<br>Jersey: -3.6 to +5.0<br>Brown Swiss: -1.6 to +3.0 | Informational for producers who use a voluntary waiting period on a herd level and want cows to cycle, get bred, and become pregnant quickly, regardless of the number of services. |
| **Cow Conception Rate (CCR)** | Percent (%) | Holstein: -8.3 to +7.3<br>Jersey: -4.1 to +5.1<br>Brown Swiss: -3.6 to +2.9 | Best for a producer who wants to improve conception rate success per service, since this trait reflects how many inseminations are needed. |

1 - Values produced in a test run scenario. Some variation is expected in August 2026 as more phenotypic records are added and the list of Active A.I. bulls is updated.

# Daughter Pregnancy Rate (DPR)

Introduced in 2003, Daughter Pregnancy Rate PTA predicts the expected percentage of non-pregnant cows that will become pregnant in each 21-day period, relative to the breed base. DPR was updated for the August 2026 evaluation and beyond to include herd-level and lactation group voluntary waiting periods (VWP) rather than a fixed length. Genomic and genetic evaluations for DPR are provided for Ayrshire, Brown Swiss, Guernsey, Holstein, Jersey, and Milking Shorthorn (traditional only) males and females.

## Benefits of Trait

- Improves reproductive efficiency by reducing days open
- Supports improved herd reproductive performance and sustainability
- Contributes to improved longevity and lifetime productivity
- Provides a standardized reproductive performance metric that can be used across herds and management systems

## Heritability

DPR has a heritability of 2.9%. This level is typical for reproductive performance traits, indicating that genetic progress is gradual but cumulative over time.

## Description of Trait

The number of days open (days from when a cow calves to when she becomes pregnant) is transformed into a non-linear pregnancy rate with variable VWP by herd-year and lactation group as:

$$DPR_{adj} = \frac{21}{\max(21,\ \max(DO,\ 71) - VWP_{herdyr-lactgrp})} * 100,$$

*DO = days open;*
*VWP = voluntary waiting period is calculated on herd-x-year and lactation group. Lactation group categories are "first lactation only" and "later lactations."*

## Inclusion in Selection Indexes

DPR has been included in the lifetime merit indexes since 2003. As of the April 2025 update to the indexes, DPR has the following relative emphasis in each:

- Net Merit $: 2.1%
- Fluid Merit $: 2.1%
- Cheese Merit $: 2.0%
- Grazing Merit $: 5.6%

These values represent DPR's economic importance to reproductive efficiency and herd profitability. The August 2026 modifications to DPR do not affect these emphases because the weights on traits in the lifetime merit indexes are based on economic values that are not being updated. Animal variations in NM$, CM$, FM$, and GM$ that are expected with the updates to DPR will be due to changes in PTA values because of the revisions, not the relative emphasis of the trait in the index.

## How to Interpret the Trait

DPR is best for producers who use a VWP on a herd level and want cows to cycle, get bred, and become pregnant quickly, regardless of the number of services.

PTAs are interpreted based on the breed average and expressed as percentages. These averages are calculated during a test run and may vary slightly in August 2026 and beyond as additional phenotypic data becomes available.

**HO Bull A**
DPR PTA: 0.0 (%)
*Expected daughter average: 32.19%*

**JE Bull A**
DPR PTA: 0.0 (%)
*Expected daughter average: 34.98%*

**HO Bull B**
DPR PTA: +1.0 (%)
*Expected daughter average: 33.19%*

**JE Bull B**
DPR PTA: +1.0 (%)
*Expected daughter average: 35.98%*

## Data Source

The data to calculate this trait is stored in the National Cooperator Database. DPR utilizes reproductive and calving records, including insemination, pregnancy diagnosis, and calving information reported through U.S. dairy records programs.

Producers can help continue to improve reproductive performance traits by recording key information in on-farm software.

- Ensure animal ID is unique and recorded correctly
- Confirm each animal has sire, dam, and date of birth
- Properly record service sire with the NAAB code or bull ID for each reproductive event
- Record ET births

## Correlations with Other Traits

Within the reproductive performance trait portfolio, DPR is strongly genetically correlated with Cow Conception Rate (+0.94) and First Service to Conception (+0.96) and moderately correlated with Heifer Conception Rate (+0.56). These correlations allow information from related reproductive performance traits to improve evaluation accuracy, particularly when data is limited.

## Resources and Research

Published research supporting this trait and the 2026 reproductive revisions is available by scanning this QR code.

Listen to The CDCB CowCast for a conversation with lead researcher Dr. Taylor McWhorter about the 2026 revisions to reproductive traits. Available on YouTube and podcast platforms on May 12.

## Range of Population

Most animals fall within a relatively narrow range around zero, with positive values indicating higher-than-average genetic potential for pregnancy rate and negative values indicating lower-than-average genetic potential relative to the breed base. These PTA values are calculated during a pre-release analysis. Some variation is expected in the August 2026 evaluation.

| | Active A.I. Bulls ("A" Status Bulls) | | | Genomic Bulls ("G" Status Bulls) | | | Bulls born since 2000 (≥ 90% reliability) | | |
|---|---|---|---|---|---|---|---|---|---|
| | PTA Range | Mean PTA | SD | PTA Range | Mean PTA | SD | PTA Range | Mean PTA | SD |
| Ayrshire | -2.0 to +6.4 | +1.28 | 2.24 | -2.1 to +2.3 | +0.23 | 1.05 | -3.1 to +7.2 | +1.01 | 1.88 |
| Brown Swiss | -1.6 to +3.0 | +0.47 | 1.40 | -2.5 to +7.5 | +1.37 | 1.92 | -4.9 to +5.3 | -0.08 | 1.66 |
| Guernsey | -2.6 to +2.7 | +0.49 | 1.47 | -2.8 to +3.9 | +0.57 | 1.60 | -4.1 to +3.6 | -0.66 | 1.62 |
| Holstein | -5.3 to +5.7 | +0.06 | 1.46 | -3.8 to +6.1 | +0.67 | 1.08 | -7.9 to +9.5 | -1.04 | 1.94 |
| Jersey | -3.6 to +5.0 | +0.13 | 1.65 | -4.4 to +4.8 | +0.62 | 1.38 | -10.0 to +6.1 | -0.82 | 1.82 |
| Milking Shorthorn | -2.6 to +1.6 | -0.08 | 1.95 | --- | --- | | -2.5 to +3.7 | +0.76 | 1.49 |

Approximately 68% and 95% of observations fall within one and two standard deviations (SD) of the mean, respectively. The following example demonstrates how these proportions apply to active Holstein and Jersey bulls.

| | PTA Standard Deviations ("A" Status Bulls) | | | |
|---|---|---|---|---|
| | -2 | -1 | +1 | +2 |
| Holstein | -2.86 | -1.40 | +1.52 | +2.98 |
| Jersey | -3.16 | -1.52 | +1.78 | +3.43 |

## Reliability Ranges

Reliability varies by animal and is influenced by the amount of available information. Young animals typically have lower reliability, while proven sires with extensive daughter records have higher reliability.

| | "A" Status Bulls |
|---|---|
| Ayrshire | 34% to 98% |
| Brown Swiss | 63% to 99% |
| Guernsey | 38.5% to 93% |
| Holstein | 32.5% to 99% |
| Jersey | 58.8% to 99% |
| Milking Shorthorn | 52.9% to 89.8% |

# Frequently Asked Questions

### How does the revised version of DPR compare to the legacy version?

Daughter Pregnancy Rate PTA continues to predict the expected percent of non-pregnant cows that become pregnant during each 21-day period, relative to the breed base. The model used to calculate DPR was revised to account for a herd-level and lactation group-specific voluntary waiting period.

### How do the PTA values of the revised DPR compare to the legacy values?

The changes in PTA ranges, mean PTAs, and standard deviations between versions of DPR are due to the updated model and variance components. These differences reflect rescaling of the traits, rather than a true increase or decrease in underlying genetic variation.

| | Revised DPR PTA ("G" Status Bulls) | | | Legacy DPR PTA ("G" Status Bulls) | | |
|---|---|---|---|---|---|---|
| | PTA Range | Mean PTA | SD | PTA Range | Mean PTA | SD |
| **Holstein** | -3.80 to +6.10 | +0.67 | 1.08 | -6.30 to +6.60 | -0.60 | 1.26 |
| **Jersey** | -4.40 to +4.80 | +0.62 | 1.38 | -5.10 to +4.60 | -0.16 | 1.51 |

### Why was the genetic trend for DPR previously downward trending but now trending upward in the new model?

In the previous system, some long-term changes in herd management were not fully accounted for in the model. As a result, some of the effects of management choices could be incorrectly attributed to genetics, which made trends for traits like DPR and CCR appear flat or even declining. The updated model does a better job of separating genetic improvement from management effects and accounting for how on-farm practices have changed over the past 20–25 years. The change in trend does not mean biology has suddenly improved; it means we are now measuring genetic progress more accurately.

### How should farmers use the updated DPR trait and the new First Service to Conception (FSC) trait?

DPR is best for producers who use a VWP on the herd level and want cows to cycle, get bred, and become pregnant quickly, regardless of the number of services. FSC is useful for producers who select VWPs on a cow basis and want cows to get pregnant as quickly as possible after the first breeding, without focusing on how many services it takes. It's important to remember that DPR is expressed as a percentage while FSC is expressed in days. For both DPR and FSC, a positive PTA is desirable.

# Cow Conception Rate (CCR)

Introduced in 2009, Cow Conception Rate PTA predicts the expected difference in conception rate of daughters as cows, relative to the breed base. CCR was updated for the August 2026 evaluation and beyond to include a days-in-milk covariable in the model. Genomic and genetic evaluations for CCR are provided for Ayrshire, Brown Swiss, Guernsey, Holstein, Jersey, and Milking Shorthorn (traditional only) males and females.

## Benefits of Trait

- Improves genetic selection for successful conception in lactating cows
- Supports reduced breeding costs and fewer inseminations per pregnancy
- Enhances reproductive efficiency in modern herd management systems
- Complements DPR by focusing on conception success rather than time to pregnancy

## Heritability

CCR has a heritability of 2.9%. This level is typical for reproductive performance traits, indicating that genetic progress is gradual but cumulative over time.

## Description of Trait

CCR utilizes inseminations (0 for failure; 1 for success) within a lactation (maximum of seven services). These inseminations are adjusted for mating type, service sire breed, and short cycle then used to calculate a conception rate by dividing by the total number of inseminations required.

## Inclusion in Selection Indexes

CCR has been included in the lifetime merit indexes since 2014. As of the April 2025 update to the indexes, CCR has the following relative emphasis in each:

- Net Merit $: 1.8%
- Fluid Merit $: 1.8%
- Cheese Merit $: 1.7%
- Grazing Merit $: 5.2%

These values represent CCR's economic importance to reproductive efficiency and herd profitability. The August 2026 modifications to CCR do not affect these emphases because the weights on traits in the lifetime merit indexes are based on economic values that are not being updated. Animal variations in NM$, CM$, FM$, and GM$ that are expected with the updates to CCR will be due to changes in PTA values because of the revisions, not the relative emphasis of the trait in the index.

## Correlations with Other Traits

Within the reproductive performance trait portfolio, CCR is strongly correlated with Daughter Pregnancy Rate (+0.94) and First Service to Conception (+0.98) and moderately correlated with Heifer Conception Rate (+0.52). These correlations allow information from related reproductive performance traits to improve evaluation accuracy, particularly when data is limited.

## How to Interpret the Trait

CCR is best for a producer who wants to improve conception rate success per service since this trait reflects how many inseminations are needed.

PTAs are interpreted based on the breed average and expressed as percentages. A positive CCR PTA is desirable.


## Reliability Ranges

Reliability varies by animal and is influenced by the amount of available information. Young animals typically have lower reliability, while proven sires with extensive daughter records have higher reliability.

| | "A" Status Bulls |
|---|---|
| Ayrshire | 32% to 98.1% |
| Brown Swiss | 60% to 99% |
| Guernsey | 37.3% to 93% |
| Holstein | 31.5% to 99% |
| Jersey | 58.1% to 99% |
| Milking Shorthorn | 51.9% to 89.2% |

## Data Source

The data to calculate this trait is stored in the National Cooperator Database. CCR utilizes reproductive records, including insemination events, pregnancy diagnoses, and subsequent calving confirmations reported through U.S. dairy records programs.

Producers can help continue to improve reproductive performance traits by recording key information in on-farm software.

- Ensure animal ID is unique and recorded correctly
- Confirm each animal has sire, dam, and date of birth
- Properly record service sire with the NAAB code or bull ID for each reproductive event
- Record ET births

## Resources and Research

Published research supporting this trait and the 2026 reproductive revisions is available by scanning this QR code.

Listen to The CDCB CowCast for a conversation with lead researcher Dr. Taylor McWhorter about the 2026 revisions to reproductive traits. Available on YouTube and podcast platforms on May 12.

## Range of Population

Most animals fall within a relatively narrow range around zero, with positive values indicating a higher-than-average genetic ability for successful conception per insemination and negative values indicating a lower-than-average ability relative to the breed base. These PTA values are calculated during a pre-release analysis. Some variation is expected in August 2026.

| | Active A.I. Bulls ("A" Status Bulls) | | | Genomic Bulls ("G" Status Bulls) | | | Bulls born since 2000 (≥ 90% reliability) | | |
|---|---|---|---|---|---|---|---|---|---|
| | PTA Range | Mean PTA | SD | PTA Range | Mean PTA | SD | PTA Range | Mean PTA | SD |
| Ayrshire | -2.2 to +7.3 | +1.84 | 2.82 | -2.7 to +2.9 | +0.37 | 1.10 | -3.0 to +8.6 | +1.85 | 2.54 |
| Brown Swiss | -3.6 to +2.9 | +0.55 | 1.52 | -3.2 to +6.6 | +0.99 | 2.02 | -5.2 to +5.9 | -0.29 | 2.12 |
| Guernsey | -2.3 to +4.4 | +1.04 | 2.00 | -3.9 to +5.6 | +0.94 | 2.42 | -6.2 to +5.9 | -0.82 | 2.49 |
| Holstein | -8.3 to +7.3 | +0.61 | 2.16 | -5.0 to +7.4 | +1.65 | 1.58 | -9.9 to +10.5 | -1.61 | 2.46 |
| Jersey | -4.1 to +5.1 | +0.15 | 2.03 | -7.3 to +5.0 | +0.74 | 1.82 | -11.7 to +7.5 | -1.16 | 2.18 |
| Milking Shorthorn | -3.8 to +1.8 | -0.62 | 2.40 | --- | --- | --- | -3.6 to +4.5 | -0.07 | 1.88 |

Approximately 68% and 95% of observations fall within one and two standard deviations (SD) of the mean, respectively. The following example demonstrates how these proportions apply to active Holstein and Jersey bulls.

| | PTA Standard Deviations ("A" Status Bulls) | | | |
|---|---|---|---|---|
| | -2 | -1 | +1 | +2 |
| Holstein | -3.71 | -1.55 | +2.77 | +4.93 |
| Jersey | -3.91 | -1.88 | +2.18 | +4.22 |

# Frequently Asked Questions

### How does the revised version of CCR compare to the legacy version?

Cow Conception Rate PTA continues to predict the expected difference in conception rate of daughters as cows relative to the breed base. The model used to calculate CCR was revised to include a days-in-milk covariable and account for service sire breed, mating type, and short cycling with pre-adjustments to individual inseminations.

### How do the PTA values of the revised CCR compare to the legacy values?

The changes in PTA ranges, mean PTA, and standard deviations between versions of CCR are due to the updated model and variance components. These differences reflect rescaling of the traits, rather than a true increase or decrease in underlying genetic variation.

| | Revised CCR PTA ("G" Status Bulls) | | | Legacy CCR PTA ("G" Status Bulls) | | |
|---|---|---|---|---|---|---|
| | PTA Range | Mean PTA | SD | PTA Range | Mean PTA | SD |
| **Holstein** | -5.00 to +7.40 | +1.65 | 1.58 | -6.50 to +6.40 | +0.25 | 1.49 |
| **Jersey** | -7.30 to +5.00 | +0.74 | 1.82 | -5.40 to +5.10 | +0.14 | 1.61 |

### Why was the genetic trend for CCR previously downward trending but now trending upward in the new model?

In the previous system, some long-term changes in herd management were not fully accounted for. As a result, some of the effects of management choices could be incorrectly attributed to genetics, which made trends for traits like DPR and CCR appear flat or even declining. The updated model does a better job of separating genetic improvement from management effects and accounting for how on-farm practices have changed over the past 20–25 years. The change in trend does not mean biology has suddenly improved; it means we are now measuring genetic progress more accurately.

### How should farmers use the updated CCR trait?

CCR is best for a producer who wants to improve conception rate success per service, since this trait reflects how many inseminations are needed. DPR and FSC offer tools that include days open and days from first service to conception, respectively.

### What is the average number of inseminations per conception for U.S. cows?

According to data stored in the National Cooperator Database and used in genetic evaluations, the average Holstein cow that calved in 2024 in the United States is bred 2.09 times per conception. U.S. Jersey cows that calved in the same year were bred 2.07 times per conception on average.

# Heifer Conception Rate (HCR)

Introduced in 2009, Heifer Conception Rate PTA predicts the expected difference in conception rate of daughters as maiden heifers, relative to the breed base. HCR was updated for the August 2026 evaluation and beyond to account for service sire breed, mating type and short cycling. Genomic and genetic evaluations for HCR are provided for Ayrshire, Brown Swiss, Guernsey, Holstein, Jersey, and Milking Shorthorn (traditional only) males and females.

## Benefits of Trait

- Improves genetic selection for successful conception in replacement heifers
- Supports timely age at first calving and efficient heifer development
- Reduces breeding costs associated with repeated inseminations
- Complements cow reproductive performance traits by capturing reproductive performance before first calving

## Heritability

HCR has a heritability of 1.4%. This level is typical for reproductive performance traits, indicating that genetic progress is gradual but cumulative over time.

## Description of Trait

HCR utilizes inseminations (0 for failure; 1 for success) (maximum of seven services). These inseminations are adjusted for mating type, service sire breed, and short cycle then used to calculate a conception rate by dividing by the total number of inseminations required.

## Inclusion in Selection Indexes

HCR has been included in the lifetime merit indexes since 2014. As of the April 2025 update to the indexes, HCR has the following relative emphasis in each:

- Net Merit $: 0.5%
- Fluid Merit $: 0.5%
- Cheese Merit $: 0.5%
- Grazing Merit $: 0.9%

These values represent HCR's economic importance to reproductive efficiency and herd profitability. The August 2026 modifications to HCR do not affect these emphases because the weights on traits in the lifetime merit indexes are based on economic values that are not being updated. Animal variations in NM$, CM$, FM$, and GM$ that are expected with the updates to HCR will be due to changes in PTA values because of the revisions, not the relative emphasis of the trait in the index.

## Correlations with Other Traits

Within the reproductive performance trait portfolio, HCR is moderately correlated with Cow Conception Rate (+0.52), Daughter Pregnancy Rate (+0.56), and First Service to Conception (+0.47). These correlations allow information from related reproductive performance traits to improve evaluation accuracy, particularly when data is limited.

## How to Interpret the Trait

HCR is best for a producer who wants to improve conception rate success per service in the maiden heifer population since this trait reflects how many inseminations are needed.

PTAs are interpreted based on the breed average and expressed as percentages. A positive HCR PTA is desirable.

## Reliability Ranges

Reliability varies by animal and is influenced by the amount of available information. Young animals typically have lower reliability, while proven sires with extensive daughter records have higher reliability.

| | "A" Status Bulls |
|---|---|
| Ayrshire | 32% to 87% |
| Brown Swiss | 50% to 95% |
| Guernsey | 19% to 69% |
| Holstein | 19.4% to 99% |
| Jersey | 41.4% to 99% |
| Milking Shorthorn | 27.7% to 49.9% |

## Data Source

The data to calculate this trait is stored in the National Cooperator Database. HCR utilizes reproductive records for maiden heifers, including insemination events, pregnancy diagnoses, and subsequent calving confirmations reported through U.S. dairy records programs.

Producers can help continue to improve reproductive performance traits by recording key information in on-farm software.

- Ensure animal ID is unique and recorded correctly
- Confirm each animal has sire, dam, and date of birth
- Properly record service sire with the NAAB code or bull ID for each reproductive event
- Record ET births

## Resources and Research

Published research supporting this trait and the 2026 reproductive revisions is available by scanning this QR code.

Listen to The CDCB CowCast for a conversation with lead researcher Dr. Taylor McWhorter about the 2026 revisions to reproductive traits. Available on YouTube and podcast platforms on May 12.

## Range of Population

Most animals cluster near zero, with positive values indicating a higher-than-average genetic ability for successful conception per insemination in heifers and negative values indicating a lower-than-average ability relative to the breed base. These PTA values are calculated during a pre-release analysis. Some variation is expected in the August 2026 evaluation.

| | Active A.I. Bulls ("A" Status Bulls) | | | Genomic Bulls ("G" Status Bulls) | | | Bulls born since 2000 (≥ 90% reliability) | | |
|---|---|---|---|---|---|---|---|---|---|
| | PTA Range | Mean PTA | SD | PTA Range | Mean PTA | SD | PTA Range | Mean PTA | SD |
| Ayrshire | -0.7 to +10.2 | +3.38 | 3.78 | -1.7 to +2.5 | +0.60 | 0.95 | -1.7 to +8.1 | +3.91 | 4.11 |
| Brown Swiss | -5.6 to +3.7 | -0.02 | 1.74 | -2.9 to +4.2 | +0.54 | 1.27 | -5.6 to +4.3 | -0.41 | 2.55 |
| Guernsey | -2.8 to +3.4 | +0.48 | 1.65 | -2.7 to +3.7 | +0.22 | 1.59 | *** | *** | *** |
| Holstein | -5.3 to +4.6 | +0.22 | 1.50 | -4.9 to +5.1 | +0.77 | 1.22 | -7.9 to +6.0 | -0.31 | 1.83 |
| Jersey | -3.4 to +4.2 | -0.03 | 1.58 | -3.9 to +3.6 | +0.32 | 1.26 | -7.0 to +5.7 | -0.52 | 2.06 |
| Milking Shorthorn | -2.3 to +2.0 | -0.53 | 1.54 | --- | --- | --- | *** | *** | *** |

*** – Insufficient number of bulls to calculate statistics.

Approximately 68% and 95% of observations fall within one and two standard deviations (SD) of the mean, respectively. The following example demonstrates how these proportions apply to active Holstein and Jersey bulls.

| | PTA Standard Deviations ("A" Status Bulls) | | | |
|---|---|---|---|---|
| | -2 | -1 | +1 | +2 |
| Holstein | -2.78 | -1.28 | +1.71 | +3.21 |
| Jersey | -3.19 | -1.61 | +1.54 | +3.12 |

# Frequently Asked Questions

### How does the revised version of HCR compare to the legacy version?

Heifer Conception Rate PTA continues to predict the expected difference in conception rate of daughters as maiden heifers relative to the breed base. The model used to calculate HCR was revised to account for service sire breed as well as mating type and short cycling.

### How do the PTA values of the revised HCR compare to the legacy values?

The changes in PTA ranges, mean PTA, and standard deviations between versions of HCR are due to the updated model and variance components. These differences reflect rescaling of the traits, rather than a true increase or decrease in underlying genetic variation.

| | Revised HCR PTA ("G" Status Bulls) | | | Legacy HCR PTA ("G" Status Bulls) | | |
|---|---|---|---|---|---|---|
| | PTA Range | Mean PTA | SD | PTA Range | Mean PTA | SD |
| **Holstein** | -4.90 to +5.10 | +0.77 | 1.22 | -5.50 to +5.70 | +0.88 | 1.37 |
| **Jersey** | -3.90 to +3.60 | +0.32 | 1.26 | -4.40 to +3.80 | +0.33 | 1.36 |

### How should farmers use the updated HCR trait?

HCR is best for a producer who wants to improve conception rate success per service in the maiden heifer population since this trait reflects how many inseminations are needed.

### What is the average number of inseminations per conception for U.S. heifers?

According to data stored in the National Cooperator Database and used in genetic evaluations, the average Holstein heifer that calved in 2024 in the United States is bred 1.77 times per conception. U.S. Jersey heifers that calved in the same year were bred 1.85 times per conception on average.

# Early First Calving (EFC)

Introduced in 2019, Early First Calving PTA predicts an animal's genetic ability to influence the age at which a female offspring has her first calving, expressed in days relative to the breed base. Already handled as an uncorrelated trait, EFC was updated for the August 2026 evaluation and beyond to be calculated in a single-trait model. Genomic and genetic evaluations for EFC are provided for Ayrshire, Brown Swiss, Guernsey, Holstein, Jersey, and Milking Shorthorn (traditional only) males and females.

## Benefits of Trait

- Supports earlier reproductive maturity in replacement heifers
- Contributes to improved lifetime productivity and herd efficiency
- Reduces non-productive days prior to first lactation
- Complements conception-based reproductive performance traits by capturing timing of reproductive onset

## Heritability

EFC has a heritability of 6.0%. This is higher than the other reproductive performance traits, indicating meaningful genetic variation for age at first calving.

## Description of Trait

EFC is the number of days from birth to a cow's first calving. Fewer days are desirable, so the number of days is multiplied by -1 to make a positive PTA desirable.

## Inclusion in Selection Indexes

EFC has been included in the lifetime merit indexes since 2021. As of the April 2025 update to the indexes, EFC has the following relative emphasis in each:

- Net Merit $: 1.0%
- Fluid Merit $: 1.0%
- Cheese Merit $: 1.0%
- Grazing Merit $: 0.8%

These values represent EFC's economic importance to reproductive efficiency and herd profitability. The August 2026 modifications to EFC do not affect these emphases because the weights on traits in the lifetime merit indexes are based on economic values that are not being updated. Animal variations in NM$, CM$, FM$, and GM$ that are expected with the updates to EFC will be due to changes in PTA values because of the revisions, not the relative emphasis of the trait in the index.

## Correlations with Other Traits

EFC is treated as uncorrelated with the other reproductive performance traits. This reflects that EFC captures age-related reproductive timing rather than insemination success.

## How to Interpret the Trait

PTAs are interpreted based on the breed average and expressed as days. These averages are calculated during a test run and may vary slightly in August and beyond as additional phenotypic data becomes available.

Positive PTA values indicate days fewer than the breed average. Negative PTA values indicate additional days compared to the breed average.

**HO Bull A**
EFC PTA: 0.0 (days)
*Expected daughter average: 723.47 days*

**JE Bull A**
EFC PTA: 0.0 (days)
*Expected daughter average: 693.39 days*

**HO Bull B**
EFC PTA: +3.0 (days)
*Expected daughter average: 720.47 days*

**JE Bull B**
EFC PTA: +3.0 (days)
*Expected daughter average: 690.39 days*

## Data Source

The data to calculate this trait is stored in the National Cooperator Database. EFC utilizes calving records, including birth dates and first calving dates reported through U.S. dairy records programs.

Producers can help continue to improve reproductive performance traits by recording key information in on-farm software.

- Ensure animal ID is unique and recorded correctly
- Confirm each animal has sire, dam, and date of birth
- Properly record service sire with the NAAB code or bull ID for each reproductive event
- Record ET births

## Resources and Research

Published research supporting this trait and the 2026 reproductive revisions is available by scanning this QR code.

Listen to The CDCB CowCast for a conversation with lead researcher Dr. Taylor McWhorter about the 2026 revisions to reproductive traits. Available on YouTube and podcast platforms on May 12.

## Range of Population

Most animals fall within a relatively narrow range around zero, with more positive values indicating earlier-than-average age at first calving and more negative values indicating later-than-average age at first calving, relative to the breed base. These PTA values are calculated during a pre-release analysis. Some variation is expected in the August 2026 evaluation.

| | Active A.I. Bulls ("A" Status Bulls) | | | Genomic Bulls ("G" Status Bulls) | | | Bulls born since 2000 (≥ 90% reliability) | | |
|---|---|---|---|---|---|---|---|---|---|
| | PTA Range | Mean PTA | SD | PTA Range | Mean PTA | SD | PTA Range | Mean PTA | SD |
| Ayrshire | -3.3 to +33.6 | +13.94 | 14.38 | -6.0 to +14.4 | +3.73 | 5.22 | -3.2 to +31.7 | +21.50 | 9.56 |
| Brown Swiss | -9.4 to +8.9 | +0.70 | 4.88 | -6.4 to +10.6 | +3.95 | 3.55 | -14.5 to +19.5 | +0.94 | 6.87 |
| Guernsey | -7.7 to +17.9 | +0.87 | 6.05 | -9.0 to +10.5 | -0.36 | 4.46 | -7.1 to +5.2 | +0.48 | 5.46 |
| Holstein | -16.9 to +8.4 | +0.74 | 3.46 | -10.5 to +8.5 | +2.10 | 2.40 | -24.2 to +17.1 | -0.26 | 3.24 |
| Jersey | -13.1 to +10.1 | +0.67 | 3.12 | -7.7 to +7.6 | +0.78 | 2.57 | -12.5 to +16.0 | -0.37 | 3.22 |
| Milking Shorthorn | -1.7 to +7.9 | +3.48 | 3.91 | --- | --- | --- | *** | *** | *** |

*** – Insufficient number of bulls to calculate statistics.

Approximately 68% and 95% of observations fall within one and two standard deviations (SD) of the mean, respectively. The following example demonstrates how these proportions apply to active Holstein and Jersey bulls.

| | PTA Standard Deviations ("A" Status Bulls) | | | |
|---|---|---|---|---|
| | -2 | -1 | +1 | +2 |
| Holstein | -6.19 | -2.72 | +4.21 | +7.67 |
| Jersey | -5.57 | -2.45 | +3.80 | +6.92 |

### Reliability Ranges

Reliability varies by animal and is influenced by the amount of available information. Young animals typically have lower reliability, while proven sires with extensive daughter records have higher reliability.

| | "A" Status Bulls |
|---|---|
| Ayrshire | 27% to 94.8% |
| Brown Swiss | 33% to 97% |
| Guernsey | 24% to 77% |
| Holstein | 24.3% to 99% |
| Jersey | 43.7% to 99% |
| Milking Shorthorn | 29.1% to 69.7% |

# Frequently Asked Questions

### How does the revised version of EFC compare to the legacy version?

Early First Calving PTA continues to predict days above or before the breed average that a female offspring will have her first calf. The primary change for this trait in the 2026 revisions is a move to a single-trait model for computational efficiency.

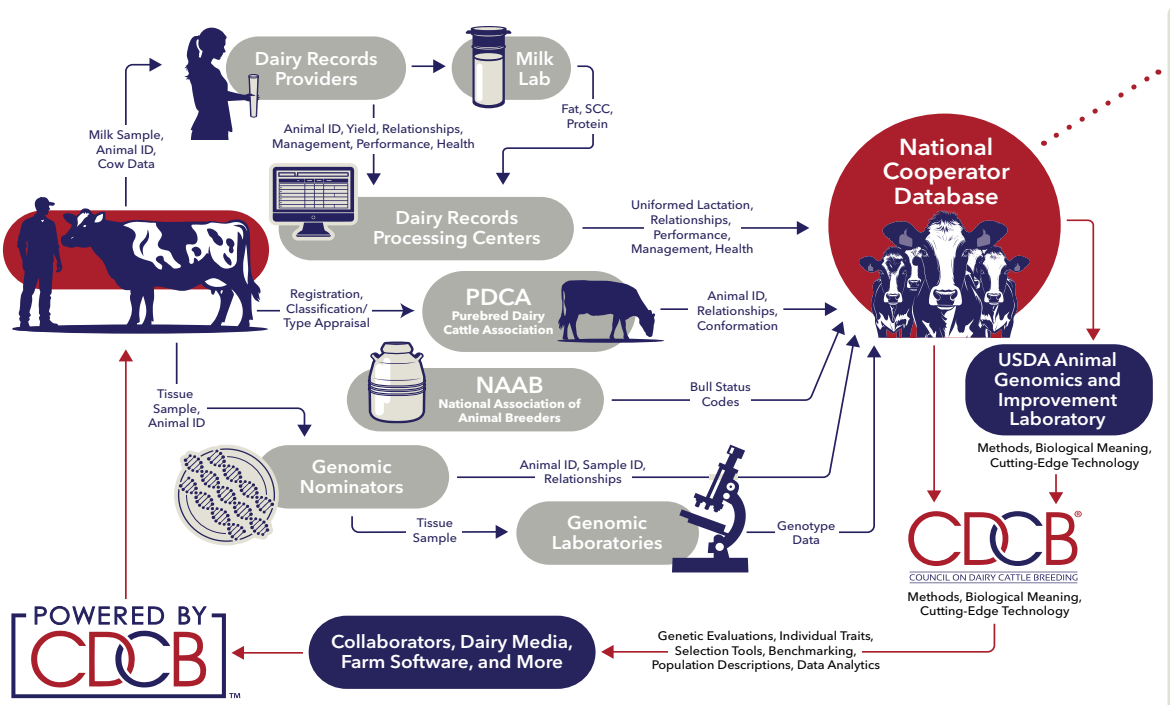
### How do the PTA values of the revised EFC compare to the legacy values?

The changes in PTA ranges, mean PTA, and standard deviations between versions of EFC are due to the updated model and variance components. These differences reflect rescaling of the traits, rather than a true increase or decrease in underlying genetic variation.

| | Revised EFC PTA ("G" Status Bulls) | | | Legacy EFC PTA ("G" Status Bulls) | | |
|---|---|---|---|---|---|---|
| | PTA Range | Mean PTA | SD | PTA Range | Mean PTA | SD |
| **Holstein** | -10.50 to +8.50 | +2.10 | 2.40 | -10.90 to +9.50 | +2.18 | 2.50 |
| **Jersey** | -7.70 to +7.60 | +0.78 | 2.57 | -6.70 to +6.00 | +0.34 | 1.99 |

# How CDCB Functions in the Dairy Ecosystem

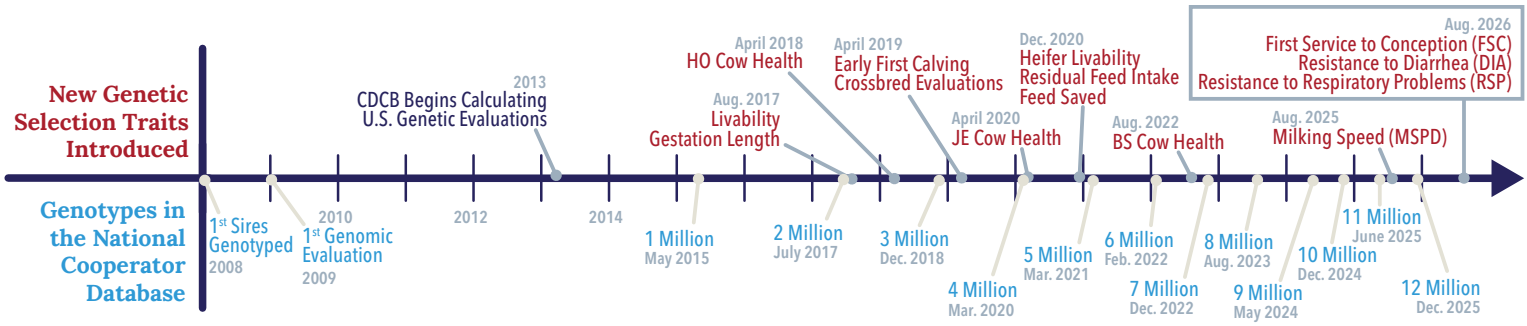
In 2013, the Council on Dairy Cattle Breeding assumed service responsibilities from USDA's Animal Genomics and Improvement Laboratory and the role as steward of the National Cooperator Database. As depicted in the graphic below, CDCB functions in a collaborative system that is supported by more than 60 dairy organizations in the U.S. and abroad. Through this framework, performance data from nearly four million cows is added to the national database on an annual basis. This real-world information is used to support 50 individual genetic selection traits and four selection indexes. It is the continued participation of nearly 10,000 herds across the U.S. that have built the reputation for U.S. genetic evaluations as the global standard. Today, genetic evaluations produced using information stored in the National Cooperator Database are recognized as Powered by CDCB – the industry collaboration designed to serve dairy producers.




## Records Used In Genetic Evaluations
(April 2026)

| | |
|---|---|
| 131.4 MILLION Cow Livability | 112 MILLION Lactation |
| 103.5 MILLION Fertility | 75.4 MILLION Somatic Cell Score |
| 41.1 MILLION Calving Ease | 13.9 MILLION Health |
| 3.7 MILLION Type (Non-HO) | 11.9 THOUSAND Residual Feed Intake |

The continual flow of cow performance information into the National Cooperator Database not only makes it possible to calculate existing selection traits but also research new tools. Since CDCB began providing evaluation services to the industry, new tools have been added to address cow and calf health, feed efficiency, fertility, and milking speed. Research is ongoing to develop traits for hoof health and mobility.




Beginning in 2008, the National Cooperator Database began storing genotypes for the calculation of genomic evaluations. This data type continues to grow exponentially as farmers rely on genomic evaluations to make both management and genetic decisions.